Easy-Laser®

Measurement and Alignment Systems

Manual

05-0100 Rev7

Display unit D279

D200 Sheave/Pulley Alignment
D450 Shaft Alignment
D505 Shaft Alignment
D525 Shaft Alignment
D600 Machine
D630 Extruder
D650 Linebore
D660 Turbine
D670 Parallelism
D800 Machine SpinLaserTechnology™

Damalini
Measurement And Alignment Technology

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APPLICATION EXAMPLES FOR EASY-LASER®

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Declaration of Conformity

Equipment:EASY-LASER® PRODUCT RANGE

Damalini AB declares that the Easy-Laser® product range is manufactured in conformity with national and international regulations.

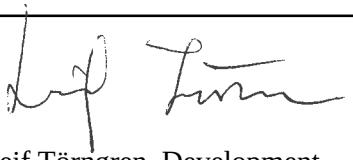
The system complies with, and has been tested according to the following requirements:

EMC Directive:	**89/336/EEC**	
Low Voltage Directive:	**73/23/EEC**	
	including amendments by Directive 93/68/EEC.	
Laser Classification:	**EUROPE**	**SS-EN-608 25-1-1994**
	USA	**CFR 1040.10/11 - 1993**

Year 2000 compliance:
The manufacturer declares that the equipment mentioned above including all software and firmware delivered with the equipment complies with the Swedish IT Commissions Year 2000 definition.

Damalini
Measurement And Alignment Technology

1 February 2000, Damalini AB



Leif Törngren, Development

CE

Easy-Laser® is a laser instrument in laser class II with an output power less than 1 mW, which only requires the following safety precautions:

! *Never stare directly into the laser beam*
Never aim the laser beam at anyone else's eyes.

NOTE! Opening the laser units can result in hazardous radiation, and will in validate the manufacturer warranty.

Warning!
If starting the machine to be measured would result in injuries, the possibility to unintentionally start it must be disabled before mounting the equipment, for example by locking the switch in the off position or removing the fuses.
These safety precautions should remain in place until the measurement equipment has been removed from the machine.
NOTE! The system should not be used in explosive risk areas.

DISCLAIMER

Damalini AB and our authorized dealers will take no responsibility for damage to machines and plant as a result of the use of Easy-Laser® measurement and alignment systems.
Even though great efforts are made to make the information in this manual free from errors, and to make the information complete for the user, there could be things we have missed, because of the large amount of information. As a result of this, we might change and correct these things in later issues without further information. Changes to the Easy-Laser® equipment may also affect the accuracy of the information.

Easy-Laser®: measurement equipment for your needs

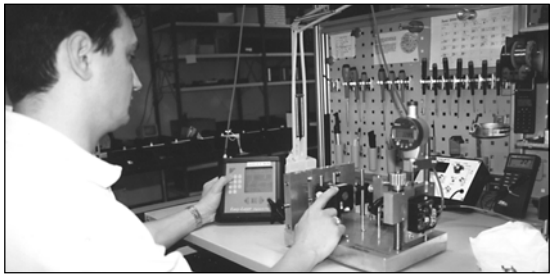
Damalini develops and manufactures Easy-Laser® for measurement and alignment of machinery and plant. We have more than 20 years of experience from measurement tasks in the field and product development. We also provide measurement service, which means that we ourselves use the equipment we develop, and continuously improve it. Because of this we dare to call ourselves measurement specialists.

Measurement service and training

Don not hesitate to contact us about your measurement problems. Our expertise will help you solve it in an easy way. For specific customer applications we develop customized systems. For the latest information, you are welcome to visit our web site.

Easy-Laser® around the world

Damalini products are used in more than 40 countries around the world. This means that as a user of Easy-Laser®, you have a lot of companions. For us this is the best source for improvements to the equipment. Wherever you are, we look forward to helping you with your measurement and alignment tasks!



Development department.

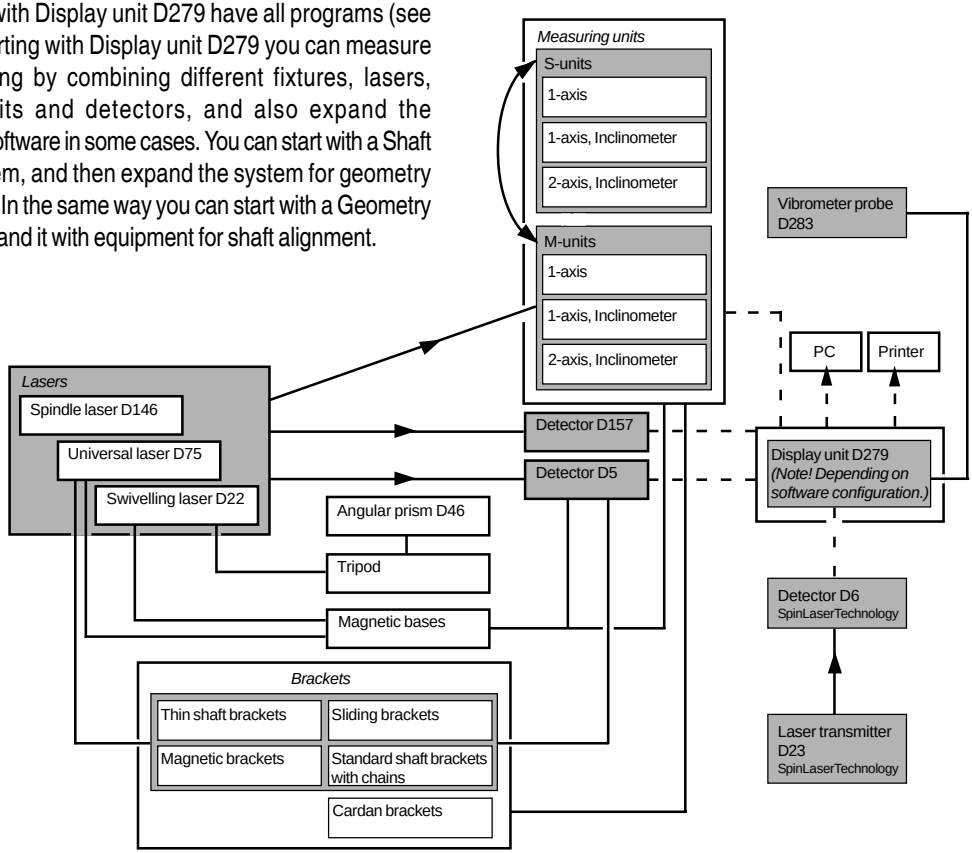
Measurement training.

Our products are used all around the world.

Systems and parts

The Easy-Laser® systems are designed to grow as the needs increase. Measurement systems D450 and D505 have as standard when delivered only programs for shaft alignment, and all other systems with Display unit D279 have all programs (see next page). Starting with Display unit D279 you can measure virtually anything by combining different fixtures, lasers, measuring units and detectors, and also expand the measurement software in some cases. You can start with a Shaft alignment system, and then expand the system for geometry measurements. In the same way you can start with a Geometry system and expand it with equipment for shaft alignment.

Schematic picture of the parts included in the Easy-Laser® measurement product range.

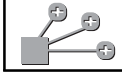


Measurement programs configurations These pages describe which programs and functions the Display unit D279 has for the different measurement systems. There is also a brief description of each program.	D450	D505	D525 D600 D630 D650 D660 D670 D800
Horizontal - For shaft alignment of horizontal machines with the 9-12-3 method.	X	X	X
Softfoot - With this program you can check that the machine is standing on all feet. Displays which foot to correct.	X	X	X
EasyTurn™ - For shaft alignment of horizontal machines. Requires only 20° between measurement points.		X	X
Cardan - Shows the angular misalignment and the adjustment value for offset mounted machines.		X	X
Vertical - For measurement of vertical and flange mounted machines.		X	X
Machine train - For the alignment of two to ten machines in a row (nine couplings). Shows the measurement values live during the alignment.		X	X
RefLock™ - Any two feet can be selected as references (locked). Works as a sub function in the Machine train program.		X	X
Thermal growth compensation - Compensates for difference in thermal growth between the machines. Works as a sub function in the Horizontal, EasyTurn™ and Machine train program.	X	X	X
Tolerance check - Checks the offset and angle values towards selected tolerance. Shows graphically when the alignment is within tolerance. Sub function.	X	X	X
Measurement Value Filter - Air with varying temperature may influence the direction of the laser beam. The filter function produces stable readings also for these conditions. Sub function in all programs except BTA Digital and Vibrometer.	X	X	X
Offset and Angle - This program displays the offset and the angular misalignment between e.g. two shafts. Shows values from both 1-axis and 2-axis measurement units. Also suitable for dynamic measurements.		X	X

	D450	D505	D525 D600 D630 D650 D660 D670 D800
Values - This program displays the values from the detector in live mode, similar to measurement with dial indicators. The values can be zeroed and halved. Up to four units can be connected in series and can be zeroed individually.		X	X
Vibrometer - Shows vibration level in ”mm/s” or ”inch/s” and bearing condition value in ”g”. The measurement complies with vibrations standard ISO10816-3.		X	X
BTA digital - For measurement and alignment of pulleys.		X	X
Straightness - For measurement of straightness on machine foundations, shafts, bearing journals etc. Handles up to 150 measurement points with two arbitrary zero points.			X
Straightness PLUS - Versatile program with advanced functions. Measurement points can be added, deleted or remeasured anytime during the measurement. The reference line can be offset set. For use as described above.			X
Flatness - Program for measurement of flatness/twist, for example on machine foundations, machine tables etc. Handles up to 300 measurement points with three zero points.			X
Squareness - For measurement of squareness in machinery and plant.			X
Parallelism - For measuring between rolls, machine sides etc. Handles up to 150 rolls or other objects. Baseline or roll can be chosen as reference. Each measurement object is given a specific name.			X
Parallelism PLUS - Versatile program with advanced functions. Measurement objects can be added, deleted or remeasured anytime during the measurement. Includes baseline measurement function. For use as described above.			X
Spindle - For measurement of centerline direction of machine spindles on machine tools, drilling machines etc.			X
PlumbLine - With this program you measure plumbline and straightness on turbine and generator shafts, for example.			X

Continued ➥

MEASUREMENT PROGRAMS

	D450	D505	D525 D600 D630 D650 D660 D670 D800
Flange - For measurement of flatness on flanges and circular planes, for example axial bearings. Up to 150 measurement points can be handled. Three zero points with 120° in between are calculated by the system.			**X**
Center of circle - This program is used when measuring the straightness of bearing journals. Allows varying diameters.			**X**
Center of circle PLUS - Versatile program with advanced functions. Measurement points can be added, deleted or remeasured anytime during the measurement. The reference line can be offset set. For use as described above.			**X**
Half-Circle - Measurement values are taken in the 9, 6 and 3 o'clock positions. Allows varying diameters. To be used with the Turbine system.			**X**
Half-Circle PLUS - Versatile program with advanced functions. Measurement points can be added, deleted or remeasured anytime during the measurement. The reference line can be offset set. For use as described above.			**X**
 **Note!** Display unit D279 can be upgraded and expanded with new software. This means that above configurations is for standard systems.	**X**	**X**	**X**

Manual

This manual describes in order:

The hardware parts:

Technical specifications and functions.

Handling the display unit:

Settings, button choices and measurement data handling.

Handling the measurement programs:

Measurement procedures step-by-step.

Measurement applications:

More examples of applications.

The basics of measurement and aligning:

The basics, technical terms etc.

Appendix:

Tolerances, Conversion tables, Problem solver.

If you are unfamiliar with measurement and alignment, we suggest that you first read the chapter *E- Measurement basics...* before you start using the system, and then go on from chapter *A*.

NOTE! In chapter *C-Measurement programs* each step describes which button to press to continue the measurement. Also there are optional choices between brackets, for example:

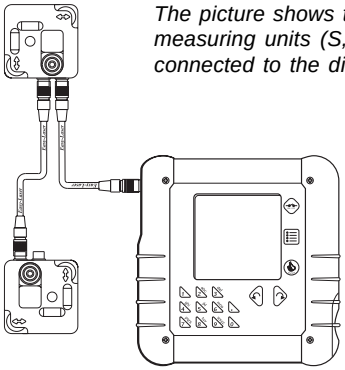
[Backstep]

Regarding the On/Off-button **:**

When you are using a measurement program and press the On/Off-button you will be directed to the program menu again. You can now choose to start another program and do another measurement. If you will not use the display unit in this mode it will automatically be shut down after 10 minutes. If you instead press the On/Off-button again the display unit will be shut down immediately.

(The display unit also has a general Auto-Off function, see page B2.)

Continued ➥



The picture shows two measuring units (S, M) connected to the display unit.

The measurement system

In the following way you connect the system to learn how to handle it. For the description of each laser, measuring unit etc, see chapter *A*.

1. Mount/place the equipment with suitable fixtures on the measurement object.

2. Connect the cable to the display unit.

3. Connect the other end of the cable to any measuring unit or detector. NOTE! You can use any of the two connections on the units.

4. If you are using a shaft alignment system, connect the other cable between the measuring units S and M.

5. Start the display unit by pressing

. The first thing displayed is the program menu. Start the desired program by keying in the program number.

Shift to Program-menu page 2 by pressing

To get to the Main menu, press

Return to previous page by pressing the Menu-button once again.

(Possible in any situation, also during measurement.)

The first line of the Main menu says *"Units found:"* shows whether the display unit is in contact with all of the connected measuring units.

NOTE! If you connect two measuring units S and M the laser lights up when a program is started. If you have a detector and a separate laser transmitter you start the transmitter by pressing its On-button.

Rough alignment before measuring

6. Now aim the laser at the detector.

Start by aiming the laser at the closed target. (For detailed description, see chapter *C, "Rough alignment"* for shaft alignment, and each program for other measurements.)

7. Open the target.

8. Enter the required distances as prompted by the system.

9. Continue the measurement as described on the display.

10. After the measurement is finished you can do the following; save the result in the display unit, if you have a printer; connect this and make a printout (see chapter *B*) or connect the display unit to a PC and transmit the data (in this case you first have to install the EasyLink™ software, see chapter *B*.)

These are the basics for getting started with the system. Easy-Laser® is easy to use, but as with most things, practical training and experience are needed to correctly and effectively carry out the measurements.

Good luck, and thanks for chosing Easy-Laser® measurement and alignment systems!

A. System

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Instruction Tilting screws A38

All systems:

All systems are delivered in aluminium framed carrying case with contoured foam insert. Size and design depending on system. Always included:
1 Protective case for display unit
1 Measuring tape
1 Manual
1 EasyLink™ PC program+cable

Note! The Laser transmitter plus Detector unit can be added separately as accessories to all systems using the D279 Display unit with BTA Digital software.

D200 Sheave/Pulley alignment system

1 Display unit D279 with 27 programs/functions
1 Cable with push-pull connectors
1 Detector unit D162
1 Laser transmitter D164

D450 Shaft Alignment system

1 Display unit D279 with 5 programs/functions
2 Cables with push-pull connectors
2 Measuring units (S, M); PSD 10x10 mm
2 Shaft brackets with chains
2 Sets of extension rods

D505 Shaft Alignment system

1 Display unit D279 with 14 programs/functions
2 Cables with push-pull connectors
2 Measuring units (S, M), PSD 18x18 mm
2 Shaft brackets with chains
2 Sets of extension rods
2 Extension chains
2 Offset brackets
2 Magnetic bases

D525 Shaft Alignment system

1 Display unit D279 with 27 programs/functions
2 Cables with push-pull connectors
2 Measuring units (S, M), PSD 18x18 mm
2 Shaft brackets with chains
2 Sets of extension rods
2 Extension chains
2 Offset brackets
2 Magnetic bases

D600 Machine *(Basic)*

1 Display unit D279 with 27 programs/functions
2 Cables with push-pull connectors (2m, 5m)
1 Detector D5
1 Magnetic base with turnable head
2 Sets of extension rods

For complete system add appropriate laser (D22, D146, D75), angular prism D46 and other accessories.

D630 Extruder system

1 Display unit D279 with 27 programs/functions
2 Cables with push-pull connectors
1 Laser transmitter D75 with fixture
1 Detector D157 with adapter plates
1 Large target Extruder

D650 Linebore system

1 Display unit D279 with 27 programs/functions
2 Cables withpush-pull connectors (2m, 5m)
1 Laser D75 with coordinate hub
1 Detector Linebore with offsethub
Arms for diameters 100–500 mm [4–20”].
1 Printer with cable and charger
1 Set of attachment items

D660 Turbine system

1 Display unit D279 with 27 programs/functions
2 Cables with push-pull connectors
1 Laser transmitter D75 with offset hub
1 Detector unit D5
1 Detector fixture with magnet bases and extension arms for diameters 150–1700 mm [5.90”–66.9”]
1 Set of probe extensions
1 Self centering target
1 Printer with cable and charger

D800 Machine system

1 Display unit D279 with 27 programs/functions
1 Laser transmitter D23
2 Cables with push-pull connectors (2m, 5m)
1 Detector D6
1 Magnet base for laser transmitter
1 Magnet base D45 with turnable head
2 Sets of extension rods

D670 Parallelism system

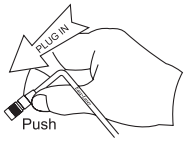
1 Display unit D279 with 27 programs/functions
2 Cables with push-pull connectors
1 Detector D5
1 Magnet base D45 with turnable head
2 Sets of extension rods
1 Swiveling laser D22
1 Sliding table
2 Large targets Base line
1 Sliding bracket with turnable head
1 Angular prism D46
2 Carrying cases
2 Tripods

A

Display unit D279: Different number of measurement programs depending on which system the display unit is included in *(the software can be expanded and upgraded through the RS232 interface)*.
Battery operated unit that reads one to four measuring units/detectors. Membrane keyboard with 16 buttons and backlit LCD display. Measurement data storage. Serial port for printer and PC communication. With protective case for rough environment.

TECHNICAL SPECIFICATIONS

Housing material	Aluminum / ABS
Keyboard	16 membrane buttons
Display	Backlit 4.5" LCD
Battery type	4 x 1.5 V R14 (C)
Operating time	48 hrs continuously 24 hours with two measuring units connected.
Displayed resolution	Changeable, down to 0.001 mm (0.05 mil)
Memory	Stores up to 1000 shaft alignments or 7000 measurement points
Connections	Measuring units/Detectors/ Vibrometer probe and serial port RS232, 9P
Dimensions	180x175x40 mm [7"x6 7/8"x1 9/16"]
Weight	1100 g [2.4 lbs]

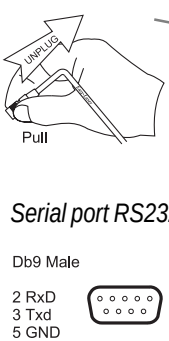


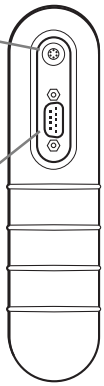
The connectors between display unit and detectors should be connected as on the picture.

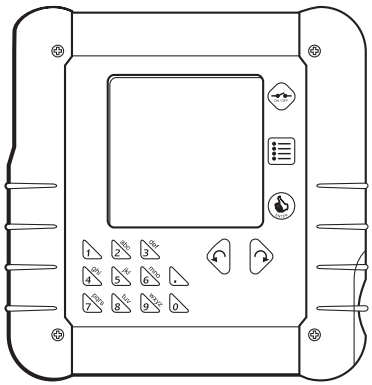
Serial port RS232

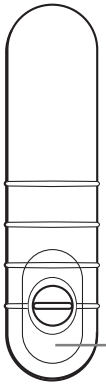
Db9 Male

2 RxD
3 Txd
5 GND
7 RTS
8 CTS





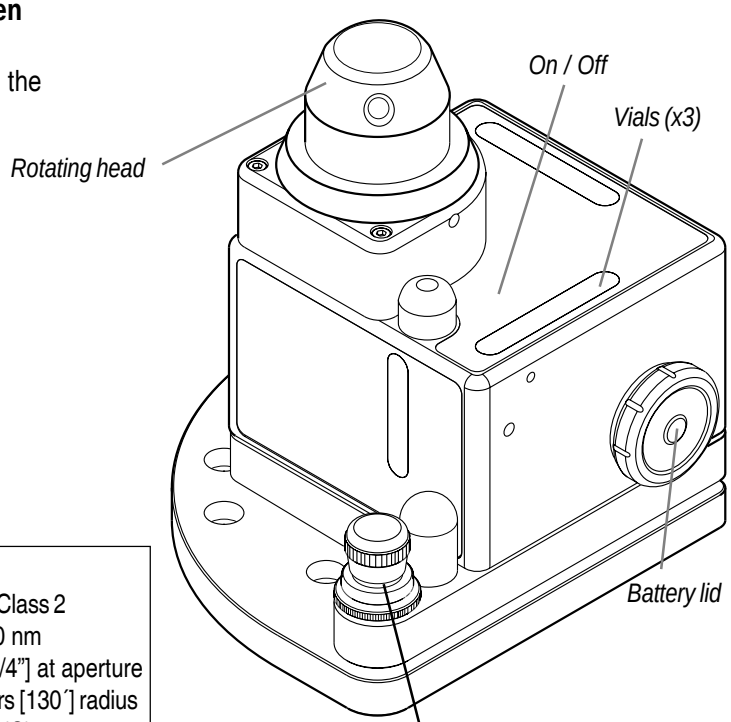




(See back of Display unit for battery direction.)

Battery lid

Laser transmitter with motor-driven rotating head (360°).
Pressing the On button once turns on the laser, next press starts rotation.

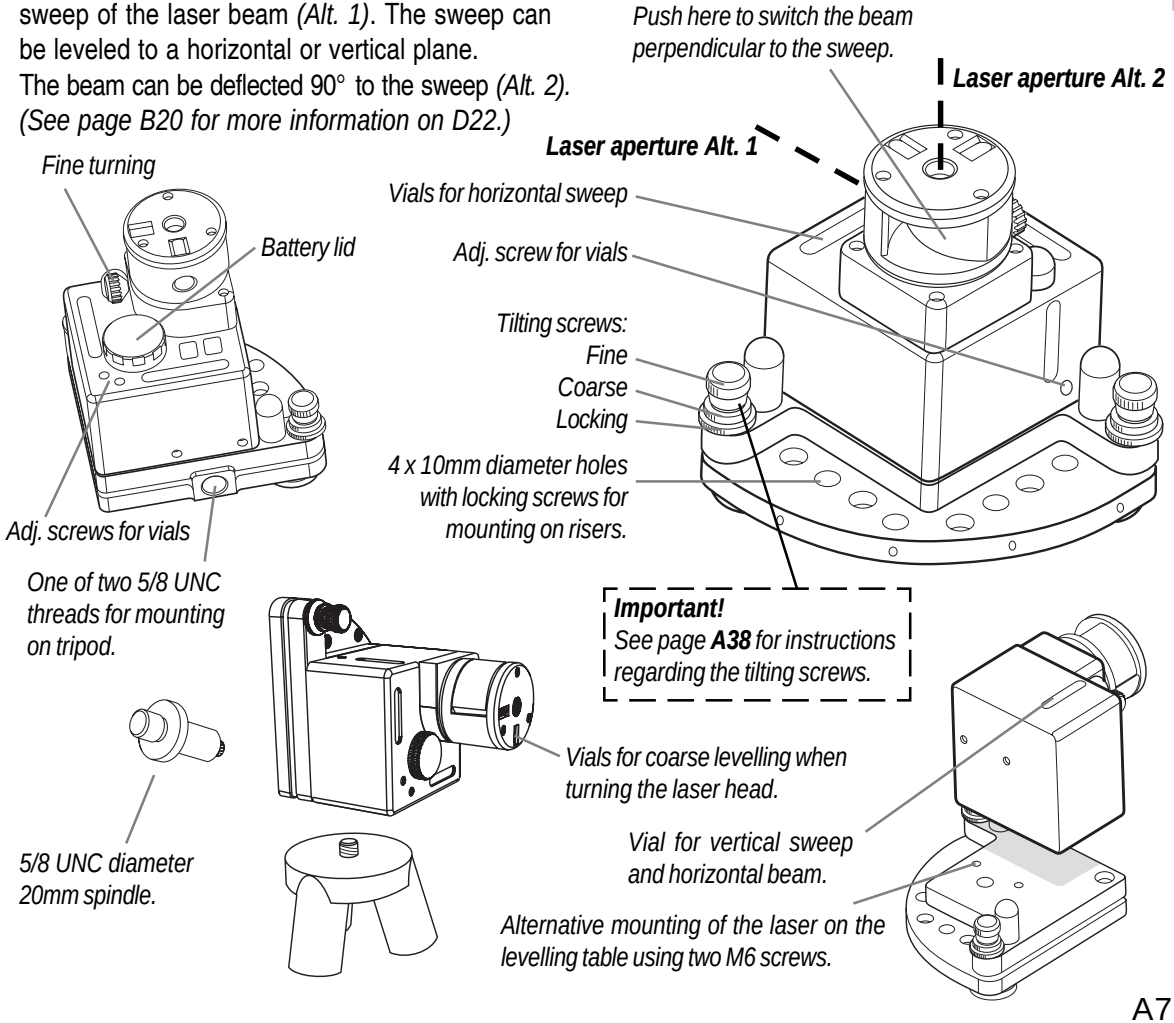


CAUTION
LASER RADIATION
DO NOT STARE INTO BEAM
DIODE LASER
1 mW MAX OUTPUT AT 670 nm
CLASS II LASER PRODUCT

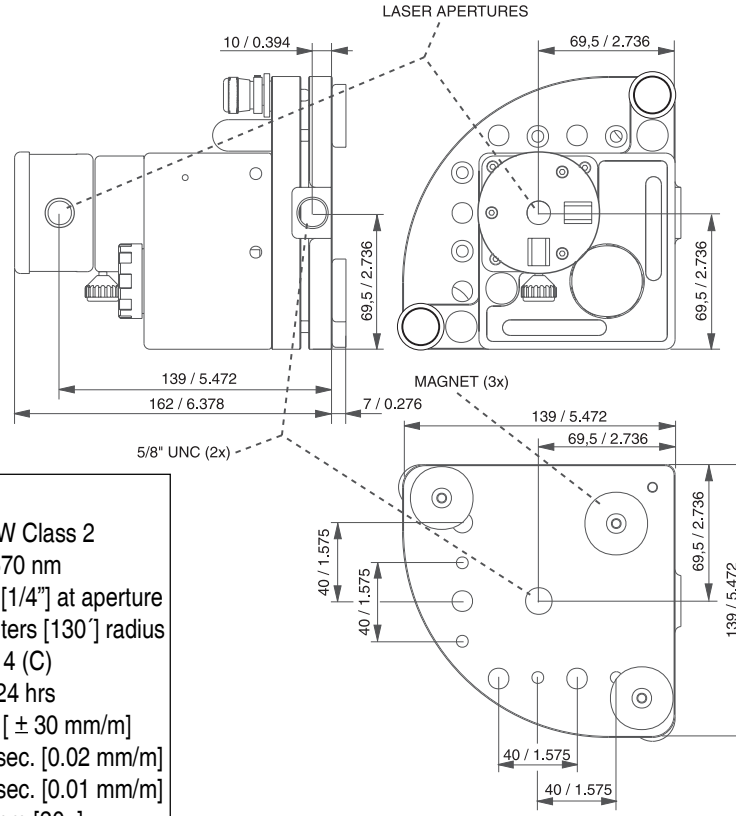
TECHNICAL SPECIFICATIONS	
Laser diode	< 1 mW Class 2
Laser wavelength	635–670 nm
Laser beam diameter	6 mm [1/4"] at aperture
Range of measurement	40 meters [130´] radius
Battery type	2 x R14 (C)
Operating time / battery	appr. 15 hrs
Leveling range	± 1.7° [± 30 mm/m]
Vials scaling	4 arc sec. [0.02 mm/m]
Flatness of sweep	0.02 mm [20µ]
Housing material	Aluminum
Weight	5.8 lbs [2650 g]

Important!
*See page **A38** for instructions regarding the tilting screws.*

Laser transmitter with swivelling head for 360° sweep of the laser beam *(Alt. 1)*. The sweep can be leveled to a horizontal or vertical plane.
The beam can be deflected 90° to the sweep *(Alt. 2)*.
(See page B20 for more information on D22.)


Push here to switch the beam perpendicular to the sweep.
Laser aperture Alt. 2
Laser aperture Alt. 1
Fine turning
Battery lid
Vials for horizontal sweep
Adj. screw for vials
Tilting screws:
Fine
Coarse
Locking
4 x 10mm diameter holes with locking screws for mounting on risers.
Adj. screws for vials
One of two 5/8 UNC threads for mounting on tripod.
Important!
See page A38 for instructions regarding the tilting screws.
Vials for coarse levelling when turning the laser head.
5/8 UNC diameter 20mm spindle.
Vial for vertical sweep and horizontal beam.
Alternative mounting of the laser on the levelling table using two M6 screws.

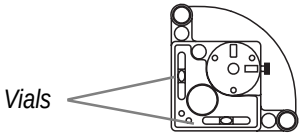
SWIVELLING LASER D22: dimensions



TECHNICAL SPECIFICATIONS

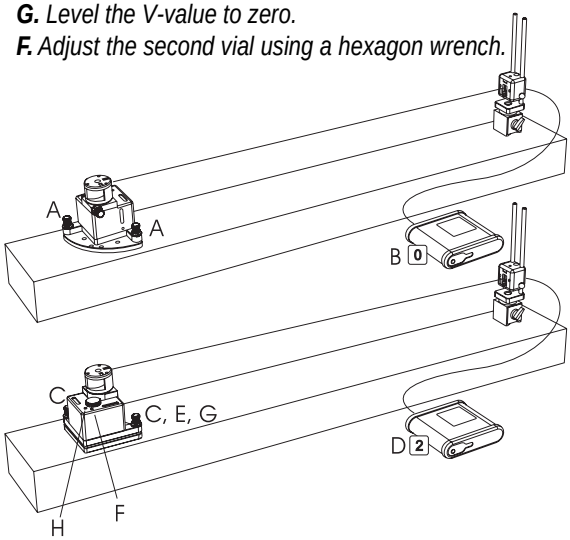
Laser diode	< 1 mW Class 2
Laser wavelength	635–670 nm
Laser beam diameter	6 mm [1/4"] at aperture
Range of measurement	40 meters [130´] radius
Battery type	1 x R14 (C)
Operating time / battery	appr. 24 hrs
Levelling range	± 1.7° [± 30 mm/m]
Vial scaling	4 arc sec. [0.02 mm/m]
Perpendicularity	2 arc sec. [0.01 mm/m]
Flatness of sweep	0.02 mm [20µ]
Fine turning	20 arc sec. [0.1 mm/m]
Vial on head scaling	0.3° [5 mm/m]
Housing material	Aluminum
Weight	5.8 lbs [2650 g]

Here we describe how you calibrate the vials on the D22 and D23. This is normally done at delivery, but can be redone when necessary. The vials are scaled to 0.02 mm/m [4 arc sec.]. Accurate levelling to the vials will achieve a repeated levelling better than the scaling of the vials, approximately 0.005 mm/m [1 arc sec.].
If the laser is to be used as a levelled reference the vials must be calibrated to the laser beam. That means that the vials are calibrated to the laser beam, and not to the bottom of the laser transmitter. Principle:
Let the laser beam pass through two fixed points, at least 1 meter apart. Turn the laser transmitter 180° and tilt the beam to pass through the two points again. Adjust the vials to half the travel. One of the fixed points is the laser transmitter, because the beam aperture is at the same height the whole turn around. The other fixed point is a detector with fixed position of the laser beam.



Use the progam Values during calibration. Long distance to detector will get you a better result (at least 1 m). Turn the laser 180° with the laser head at the centre and aim the beam backwards within 1 mm in side direction (H-value).

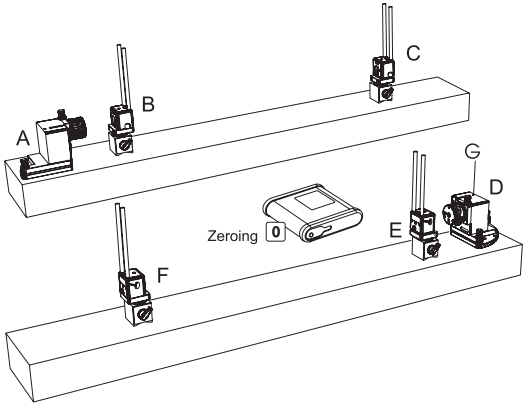
A. *Level according to vials.*
B. *Zero set on the display unit (press [0]).*
C. *Turn laser 180°.*
C. *Level according to vials.*
D. *Halve the displayed value (press [2]).*
E. *Level the V-value to zero.*
F. *Adjust the vial using a hexagon wrench.*
G. *Turn laser transmitter 90°.*
G. *Level the V-value to zero.*
F. *Adjust the second vial using a hexagon wrench.*



When calibrating the single vial on laser-transmitter D22, the sweep of the laser can be used. Place the detector in two positions, at least 1 m apart, and let the laser beam pass through this from two directions.

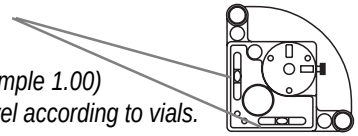
Use the three point washers placed on the magnets for proper elevation, and mount the laser as shown on picture below.

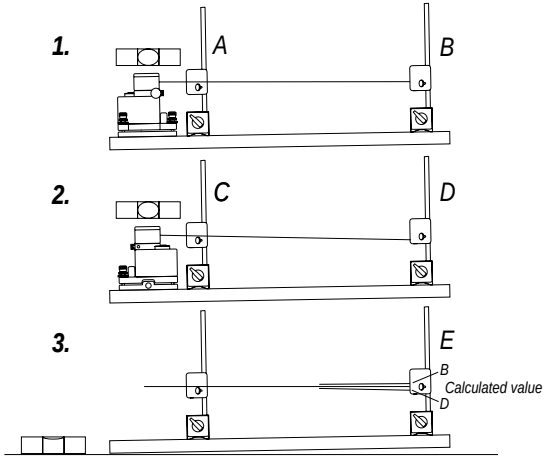
1. Level according to vial at A.
2. Zero set display at B.
3. Note the value at C.
4. Move the laser to D and level according to vial.
5. Zero set display at E.
6. Note the value at F.
7. Add C- and F-value and divide by 2.
8. Level the laser to the result from point 7.
9. Adjust the vial using a hexagon wrench.



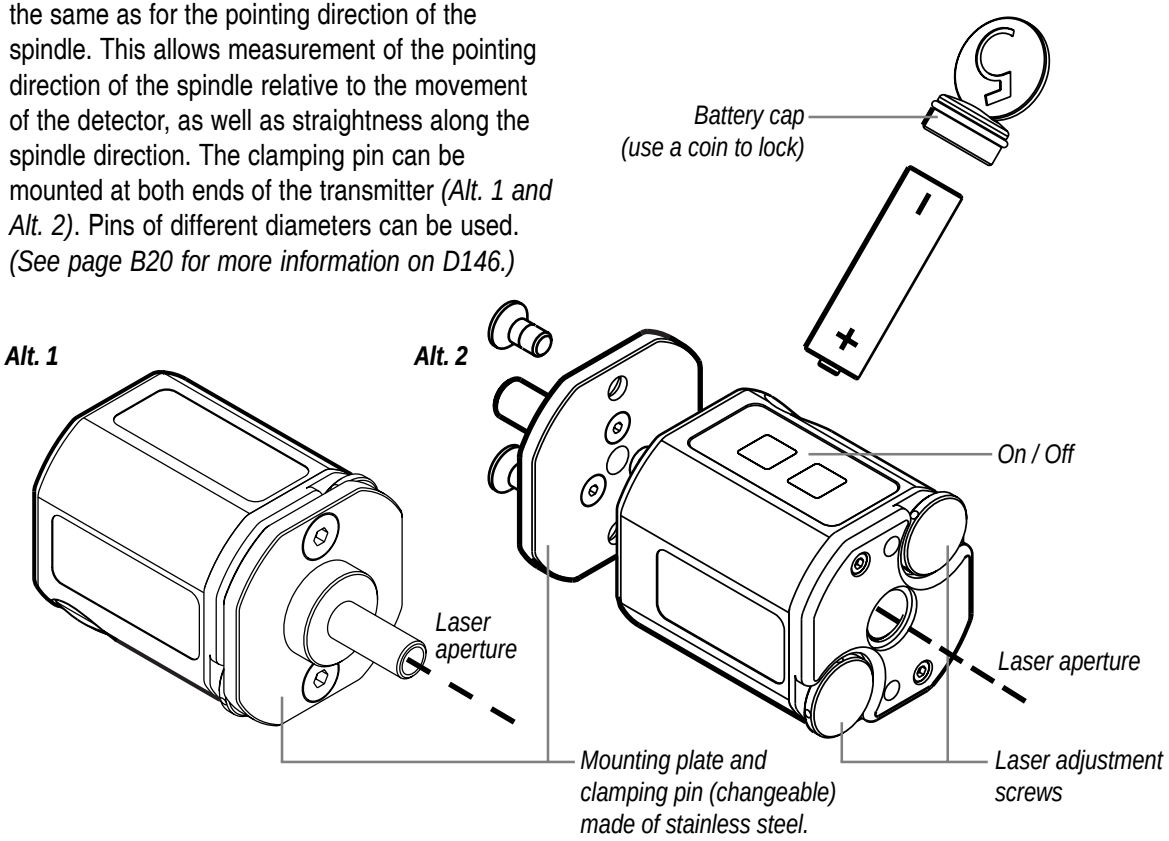
Self calibration of vials when high demands of horizontal plane. The vials on laser D22 and D23 are normally calibrated to the laser beam. Measurements that need an absolute horizontal plane to be the reference will put great demands on the calibration. Therefore any errors in the calibration are measured and compensated for. The principle is the same as for normal calibration, but can get you a better accuracy because it is done during measurement.

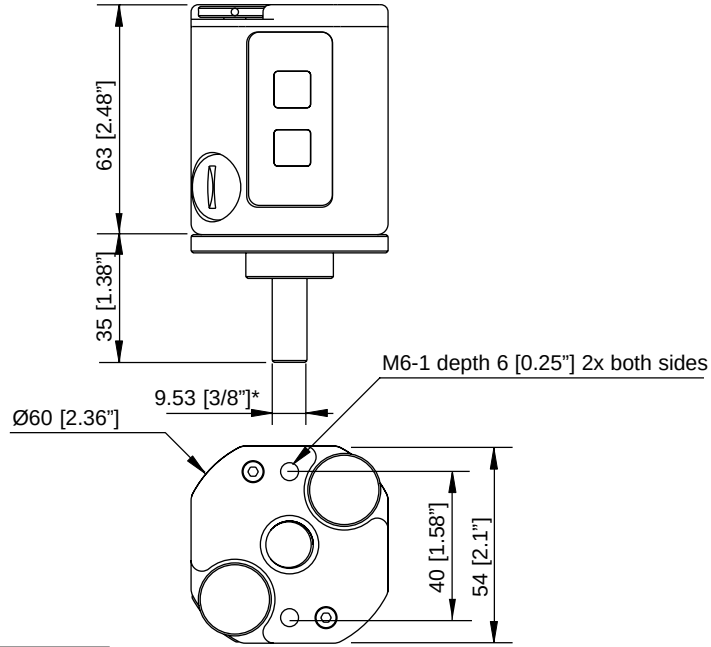
1. *Level according to vials.*
A. Zero set value.
B. Read the value (for example 1.00)
2. *Index the laser 180°, level according to vials.*
C. Zero set value.
D. Read the value(for example 2.00)
3. *E. Calculate the middle of B and D (in this case 1.50)*
This shows the difference in level of the measurement points.





Laser transmitter D146 for measurement of spindle direction and straightness. Attached to a spindle it will project concentric circles when the spindle is rotated. The centres of those circles are the same as for the pointing direction of the spindle. This allows measurement of the pointing direction of the spindle relative to the movement of the detector, as well as straightness along the spindle direction. The clamping pin can be mounted at both ends of the transmitter *(Alt. 1 and Alt. 2)*. Pins of different diameters can be used. *(See page B20 for more information on D146.)*



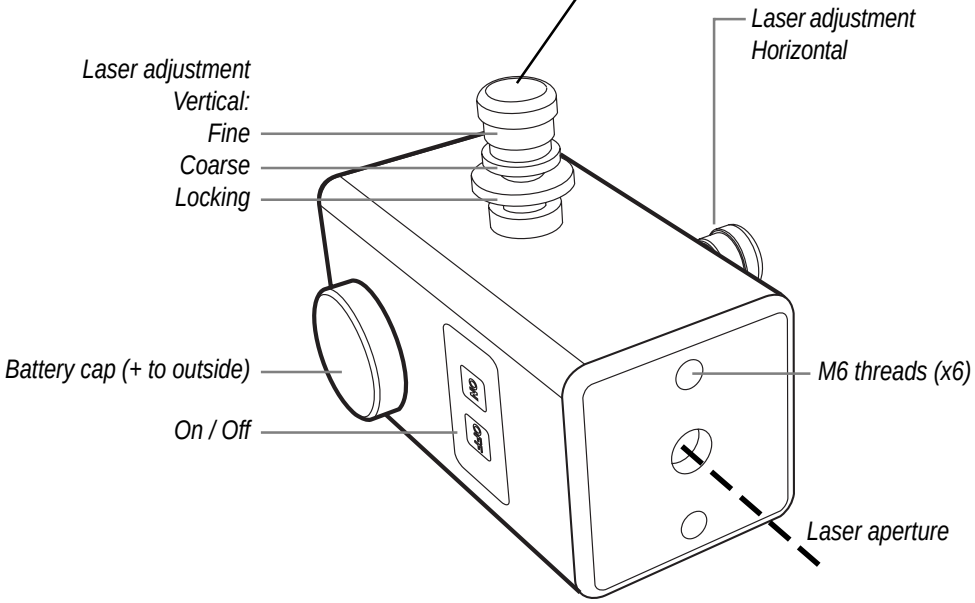


TECHNICAL SPECIFICATIONS

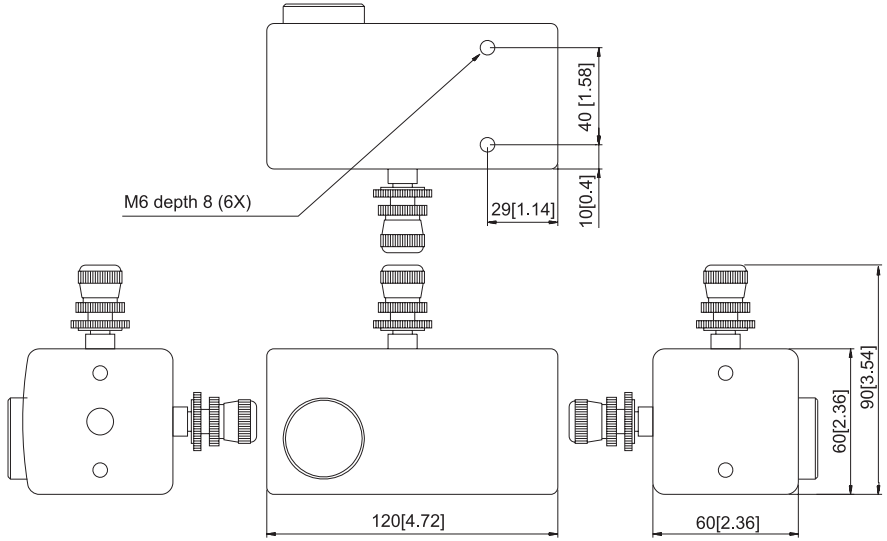
Housing material	Anodized aluminum
Laser diode	< 1mW, Class 2
Measurement distance	20 m [60´]
Battery type	1x R6 (AA)
Operating time	appr. 6 hours
Max. speed	2000 rpm
Clamping diameter*	Adapted with pin
Weight	300 g [10.5 oz]

The laser transmitter D75 is used for measurement of straightness and spindle direction. At the sides M6-threads allow alternative mounting possibilities. This transmitter comes as standard with the Extruder, Linebore and Turbine system.
(See page B20 for more information on D22.)

Important!
*See page **A38** for instructions regarding the tilting screws.*

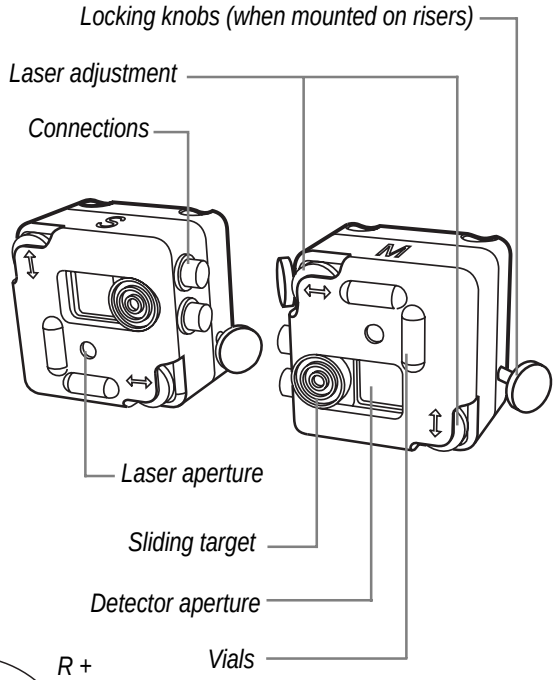


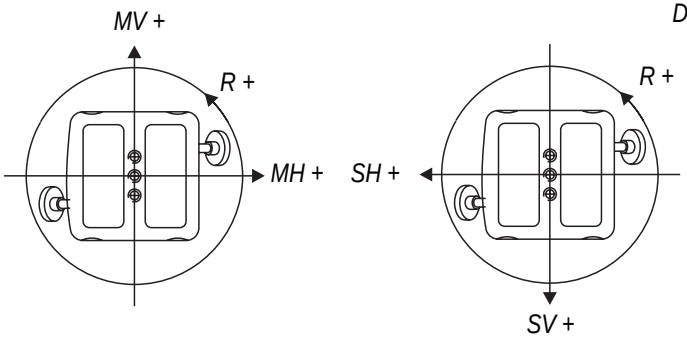
LASER TRANSMITTER D75: technical specifications



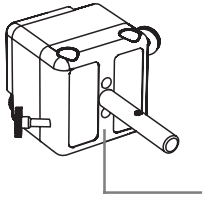
TECHNICAL SPECIFICATIONS	
Laser diode	< 1 mW Class 2
Laser wavelength	635–670 nm
Beam diameter	6 mm [1/4”] at aperture
Measurement distance	40 meter [130´]
Battery type	1 x 1.5 V R14 (C)
Operating time / battery	>15 hrs
Laser adjustment	2 ways ± 2° (± 35 mm/m)
Housing material	Anodized aluminum
Dimensions	60x60x120 mm
	[2 3/8”x2 3/8”x4 3/4”]
Weight	700 g [1.5 lb]

Measuring units with PSD detector (18x18 mm), thermal sensor, electronic 360° inclinometer and laser diode in one housing. The housing has a number of threads and mounting holes, two vials and target. Two alternative connections for display unit and other measuring units. There are versions with 2-axis detectors available (optional). Delivered as a pair with S-unit and M-unit (for **S**tationary and **M**ovable machine).

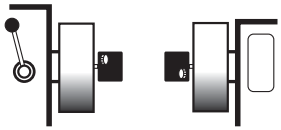


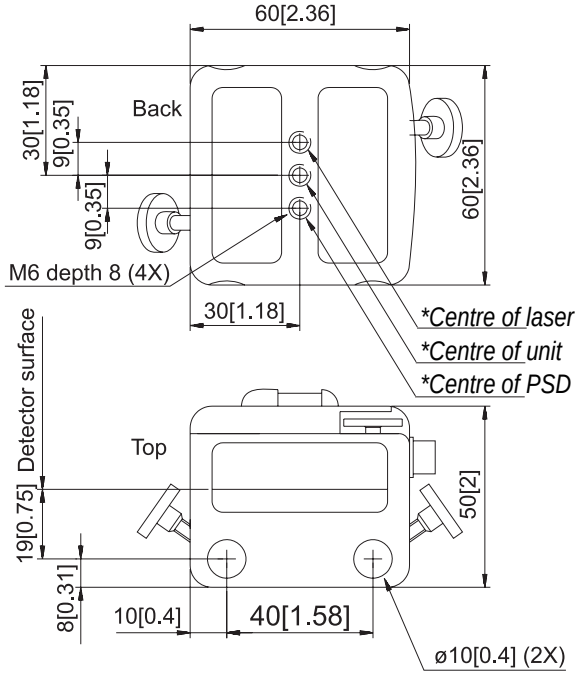


Measurement values when moved according to arrows.



**Three threads on the back allow a lot of varying attachments for other machines and new applications.*

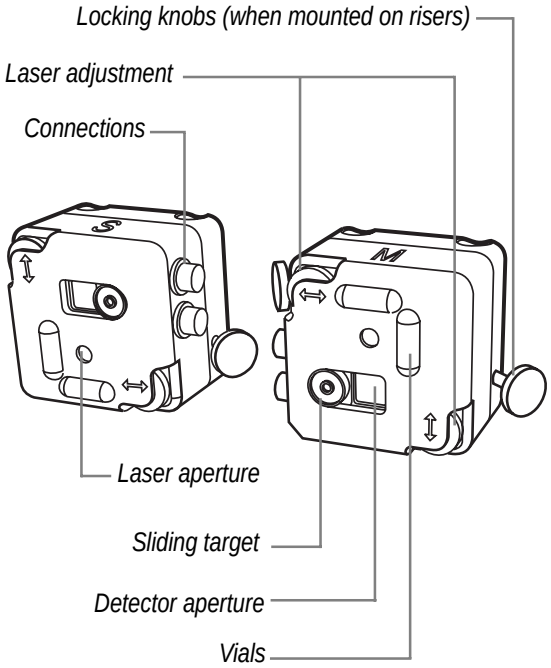


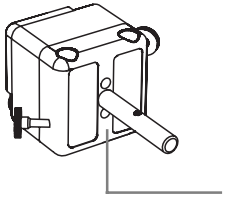


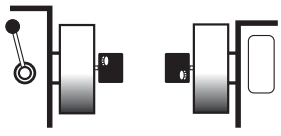
TECHNICAL SPECIFICATIONS

Detector type	1-axis alt. 2-axis PSD
Detector size	18x18 mm [3/4”x3/4”]
Linearity	Better than 1%
Laser diode	< 1 mW Class 2
Laser wavelength	635-670 nm
Beam diameter	3 mm [1/8”] at aperture
Vial scaling	5 mm/m [0.3º]
Inclinometer resolution	0.1°
Thermal sensors	± 1° accuracy
Dimensions	60x60x50 mm [2 3/8”x2 3/8”x2”]
Housing material	Aluminum
Weight	198 g [7oz]

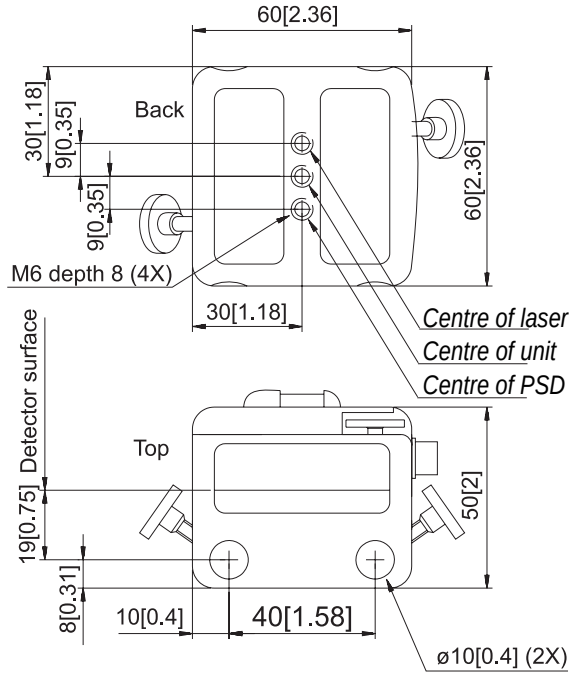
Measuring units with PSD detector (10x10 mm), and laser diode in one housing. The housing has a number of threads and mounting holes, two vials and target. Two alternative connections for display unit and the other measuring unit. Delivered as a pair with S-unit and M-unit (for **S**tationary and **M**ovable machine).
These are standard with the D450 system.







Three threads on the back allow a lot of varying attachments for other machines and new applications.

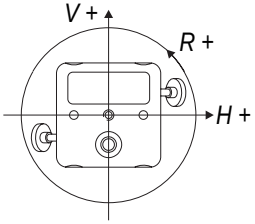


TECHNICAL SPECIFICATIONS

Detector type	1-axis PSD
Detector size	10x10 mm [3/8”x3/8”]
Linearity	Better than 1%
Laser diode	< 1 mW Class 2
Laser wavelength	635–670 nm
Beam diameter	3 mm [1/8”] at aperture
Vial scaling	5 mm/m [0.3°]
Dimensions	60x60x50 mm [2 3/8”x2 3/8”x2”]
Housing material	Aluminum
Weight	198 g [7oz]

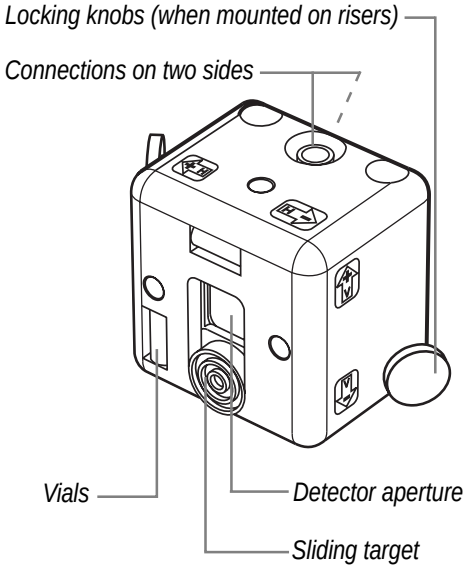
A

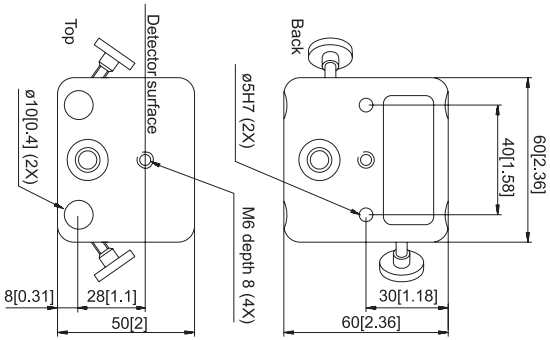
Detector that can read the position of a laserbeam. Built-in electronic 360° inclinometer and thermal sensor. A number of threads and mounting holes allow varying attachment possibilities. Vials and target for rough alignment. Two alternative connections for display unit and other detectors. Markings for measurement directions.



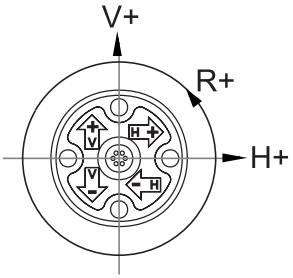
Facing towards the laser, movements of the detector to the right will give positive H-values and moving upwards will give positive V-values. Rotation anticlockwise around a horizontal axis will give positive angle values.

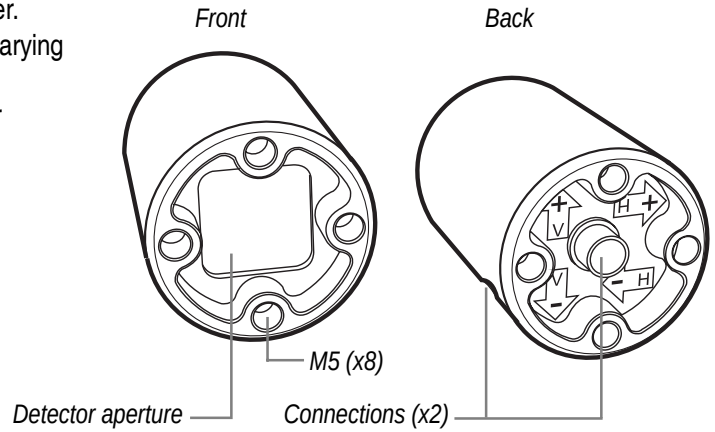
TECHNICAL SPECIFICATIONS	
Detector type	2-axis PSD
Detector size	18x18 mm [3/4”x3/4”]
Linearity	Better than 1%
Vials scaling	5 mm/m [0.3º]
Inclinometer resolution	0.1°
Thermal sensors	± 1° accuracy
Dimensions	60x60x50 mm[2 3/8”x2 3/8”x2”]
Housing material	Aluminum
Weight	198 g [7oz]





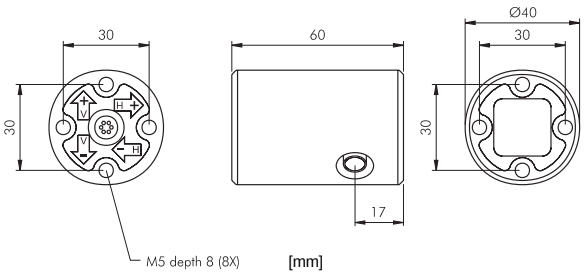
Detector that can read the position of a laser beam. Built-in electronic 360° inclinometer. Housing with eight threads (M5) allow a varying attachment possibilities. Two alternative connections for display unit. Markings for measurement directions.



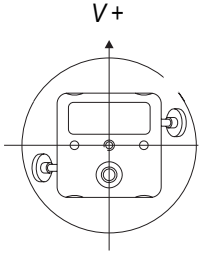


Facing towards the laser, movements of the detector to the right will give positive H-values and moving upwards will give positive V-values. Rotation anticlockwise around a horizontal axis will give positive angle values.

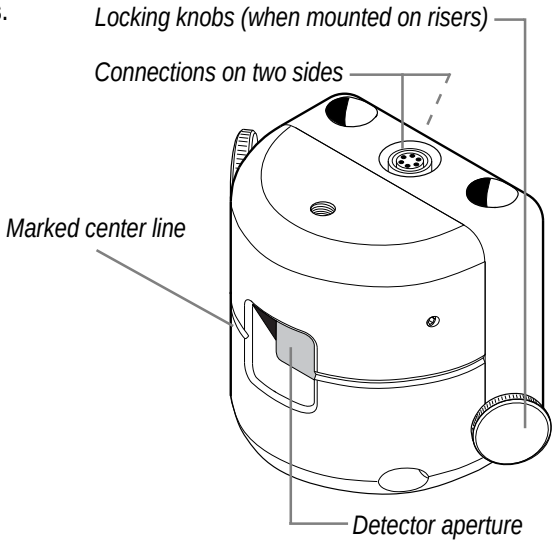
TECHNICAL SPECIFICATIONS	
Detector type	2-axis PSD
Detector size	20x20 mm [0.79”x0.79”]
Linearity	Better than 1%
Inclinometer res.	0.1°
Dimensions	Ø40[1.58”], length 60 mm [2 3/8”]
Housing material	Brass, stainless steel
Weight	198 g [7 oz]



With SpinLaserTechnology™. Detector that can read the position of a rotating laser beam from the D23 laser transmitters. Two alternative connections for display unit and other detectors.



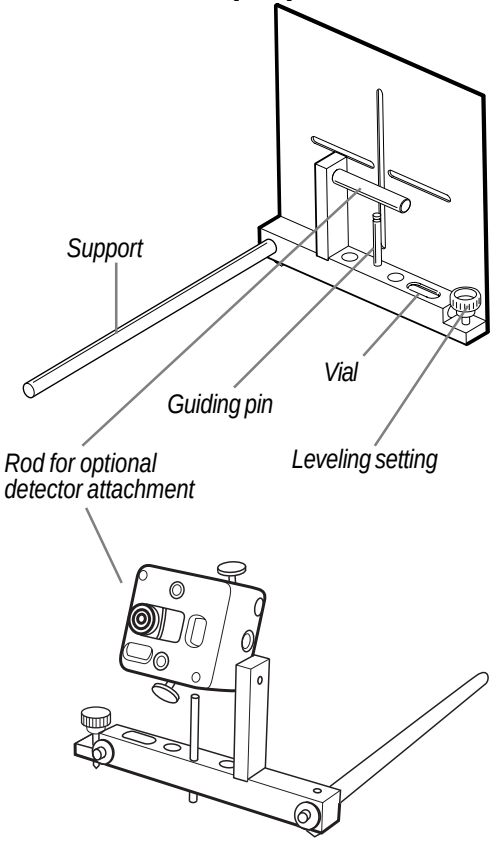
Facing towards the laser, moving upwards will give positive V-values.



TECHNICAL SPECIFICATIONS	
Detector type	1-axis PSD
Detector size	18x18 mm [3/4”x3/4”]
Linearity	Better than 1%
Dimensions	60x60x50 mm[2 3/8”x2 3/8”x2”]
Housing material	Aluminum
Weight	190 g [7oz]

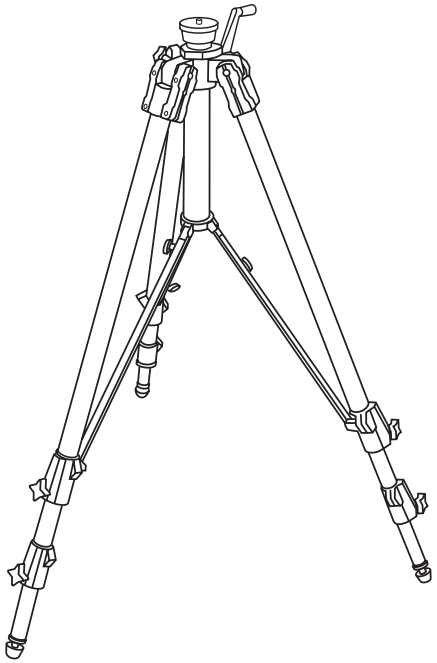
LARGE TARGET BASE LINE

Target for datum line finding/setting. For use on floor or at magnet base with rods. Instead of a target, a detector can be mounted. Target area: 200x200 mm [8x8”].



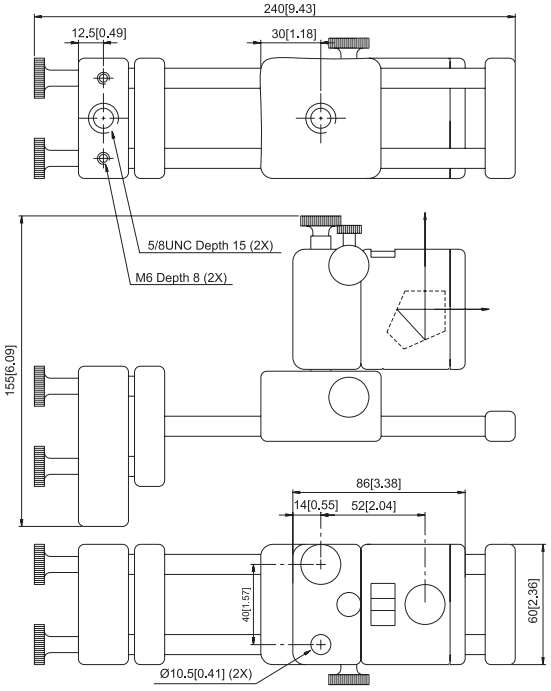
TRIPOD

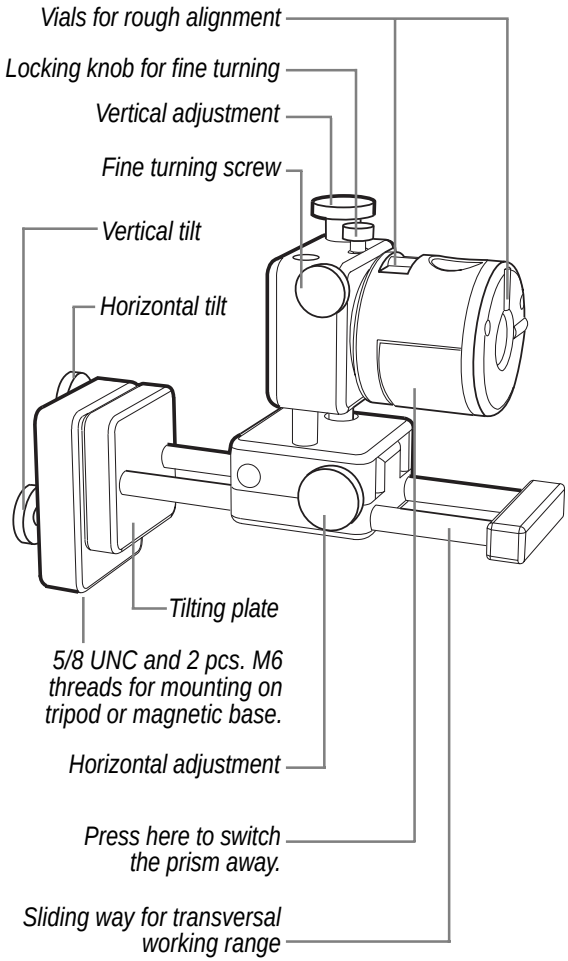
Tripod for laser transmitter and angular prism. Usable for example when measuring rolls for parallel.

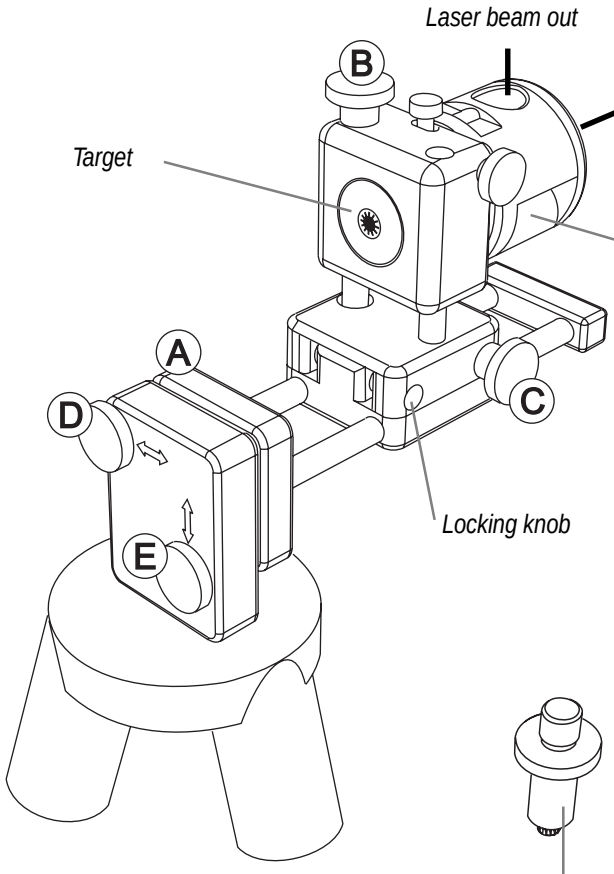


TECHNICAL SPECIFICATIONS	
Transport dim.	1110 mm [44”]
Weight	7,9 kg [17.4 lbs]
Min. – Max. height	500–2730 mm [19”–107”]
Mounting thread	5/8 UNC

For measurement of squareness and parallelism. A built-in penta prism deflects the laserbeam 90°. To keep the accuracy of the prism when measuring, the prism should be aligned to the center of and parallel to the laser beam. The prism can be switched away to let the laser beam hit a target that is used for alignment of the unit.




Vials for rough alignment
Locking knob for fine turning
Vertical adjustment
Fine turning screw
Vertical tilt
Horizontal tilt
Tilting plate
5/8 UNC and 2 pcs. M6 threads for mounting on tripod or magnetic base.
Horizontal adjustment
Press here to switch the prism away.
Sliding way for transversal working range



(The 90° unit is shown mounted on tripod.)

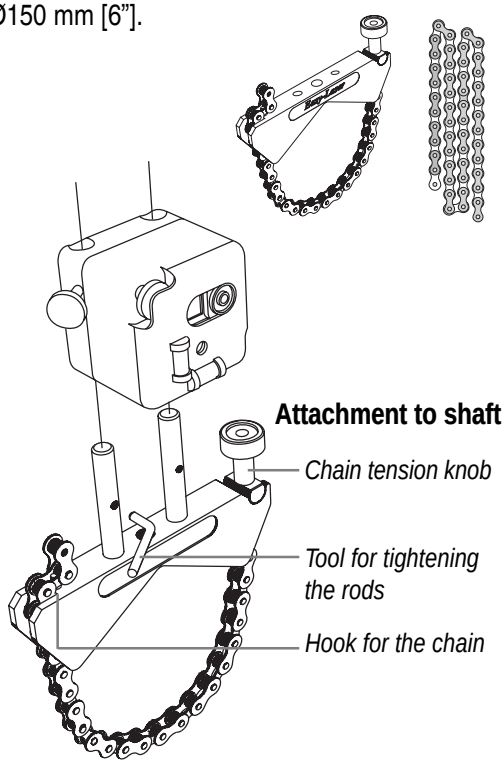
5/8 UNC - M6 spindle for mounting on magnetic base

Parallel alignment

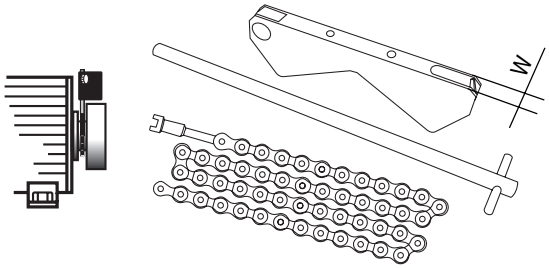
1. Switch the prism away to let the beam hit the target.
2. Slide the prism toward A and adjust with B and C until the target is concentric to the laser beam.
3. Slide the prism away from A and adjust with D and E until the target is concentric to the laser beam.
4. Repeat 2 and 3.
5.Switch the prism in, tighten the locking knob and measure.
Now the angular prism can be moved to a new position on the sliding way to aim the laser beam to the detector.

TECHNICAL DATA	
Deflection	2 arc sec. (± 0,01 mm/m)
Turning range	360°
Fine turning	0.1 mm/m [20 arc sec.]
Sliding range	± 2" [± 50 mm]
Horizontal range	± 3/16" [± 5 mm]
Vertical range	± 3/16" [± 5 mm]
Tilting range	± 2°
Aperture size	Ø 3/4" [Ø 20 mm]
Vials scaling	0.3° [5 mm/m]
Threads	5/8 UNC and M6
Housing material	Aluminum/steel
Weight	4 lbs [1800 g]

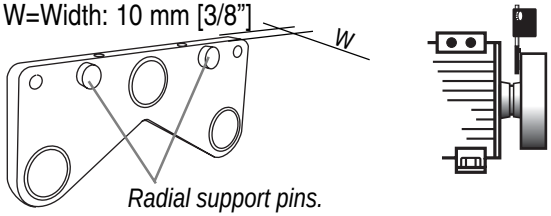
Standard Shaft brackets with chains.
For shafts Ø20–450 mm [3/4”–18”], width 20 mm [3/4”]. Extension chain for shafts larger than Ø150 mm [6”].



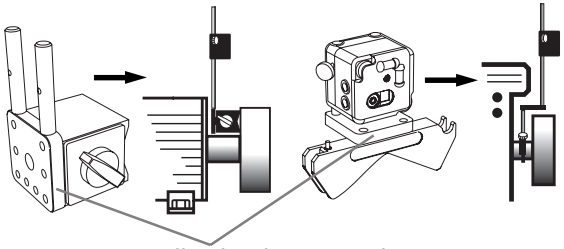
Thin shaft brackets.
W=Width: 12 mm [1/2”]. With chain and thin tool for chain tensioning.



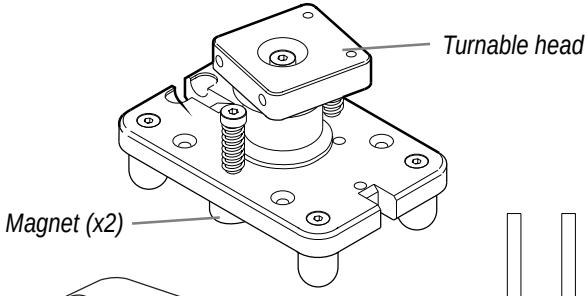
Magnetic brackets for axial mounting.
W=Width: 10 mm [3/8”]

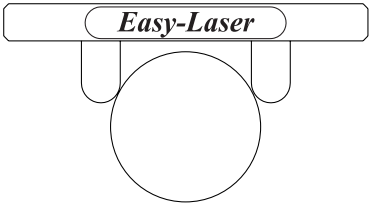


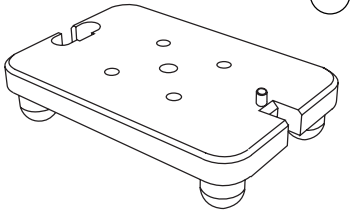
Offset brackets
Allows axial offset on brackets.



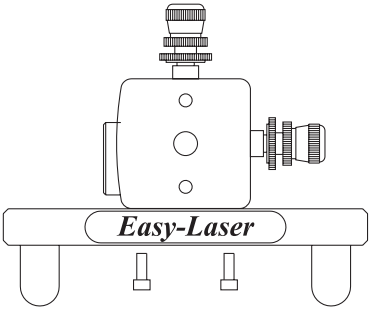
Brackets for use when turning of shafts is not possible.
To be used with standard chains or magnets and with or without turnable head depending on measurement application.



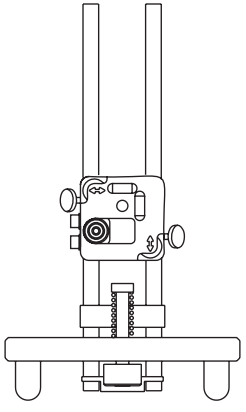




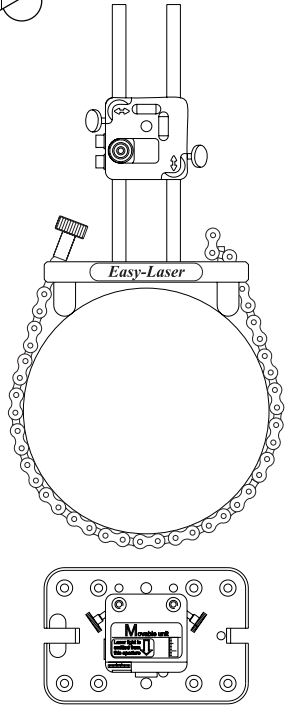
Move the four supports to the inner threads when measuring shafts Ø60–180 mm [2 3/8"–7"].



Laser D75 mounted to fixture for measurement of e.g. straightness of shaft.



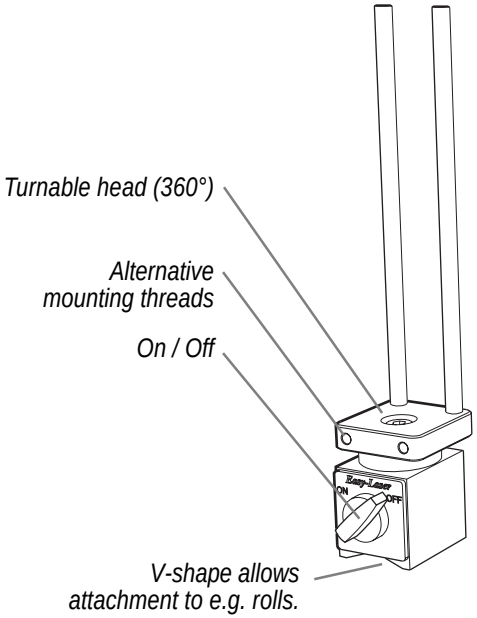
The bracket assembled for measurement of plumbline.



Bracket with standard chains.

MAGNET BASE D45

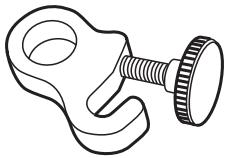
Magnet base with turnable head for detector mounting, 90° angular prism or laser. On the picture shown with risers mounted.



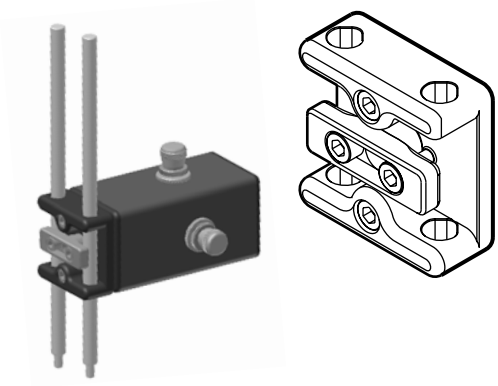
TECHNICAL SPECIFICATIONS	
Dimensions WxHxD	50x80x60 mm [2”x3 1/8”x2 3/8”]
Weight	1200 g [2.8 lbs]
Holding power	800 N

CABLE SUPPORT

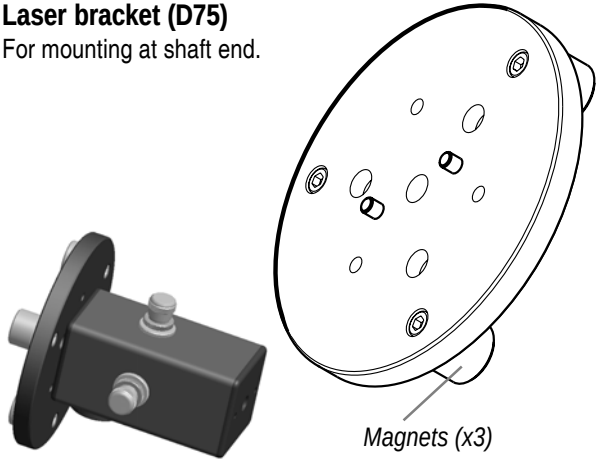
Cable support for use for example when doing flange flatness measurement on vertical flanges. Minimises the risk of moving the detector out of position, caused by a pull or a heavy load on the cable.



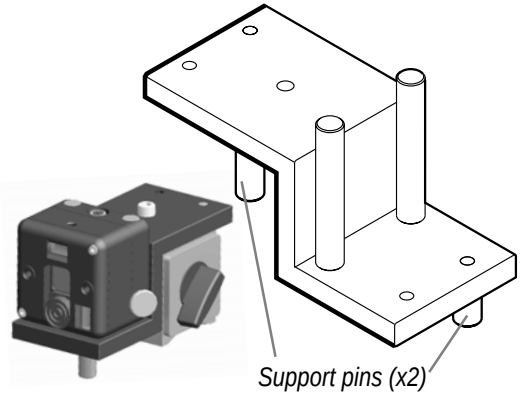
Laser bracket (D75)
For mounting on standard rods.



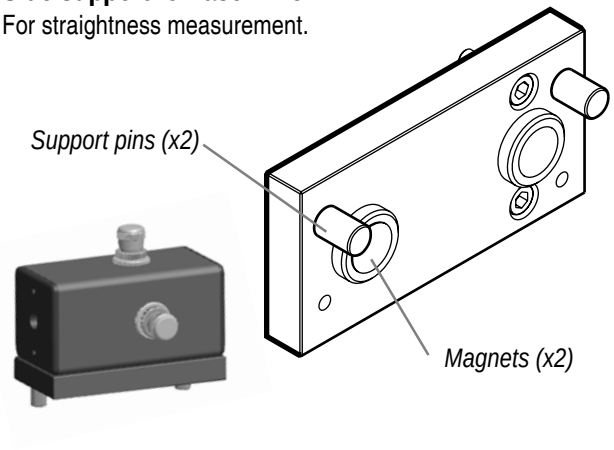
Laser bracket (D75)
For mounting at shaft end.



Side support for detector D5
For straightness measurement.



Side support for laser D75
For straightness measurement.

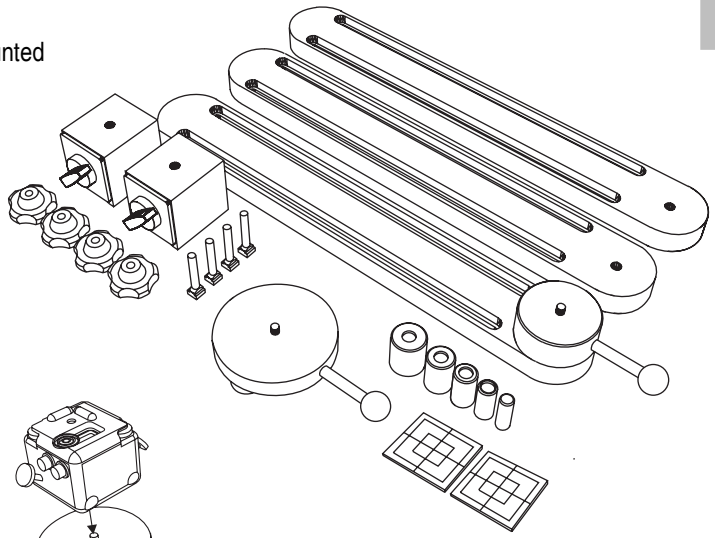


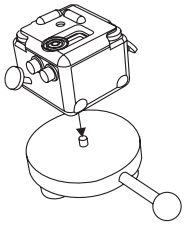
A

Cardan bracket set

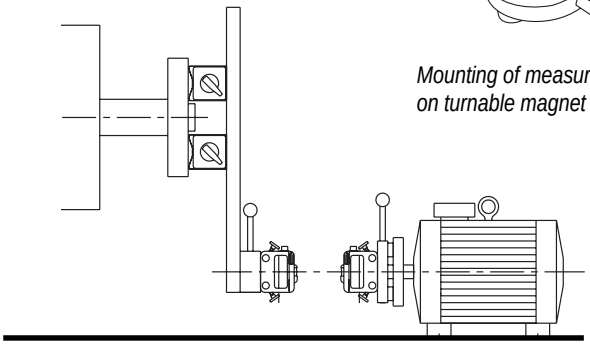
For measurement and alignment of offset mounted machines. Largest offset 900 mm [3´].

2 Magnetic bases
2 Bracket arms
1 Bracket arm with swivel head
1 Turnable magnet bracket
Guiding pins: M12, M16, M20, M24, M30
4 pcs. T-bolts
4 pcs. Knobs
5 pcs. M6x30 screw
4 pcs. M8x20 screw
2 pcs. M8x16 screw
Hexagon wrench 5 mm
Hexagon wrench 6 mm
2 pcs. Large targets

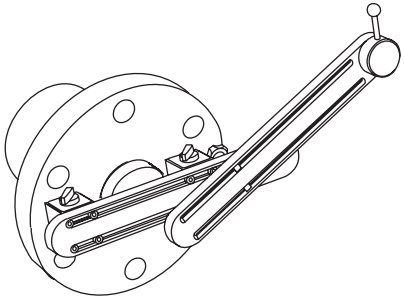




Mounting of measuring unit on turnable magnet bracket.

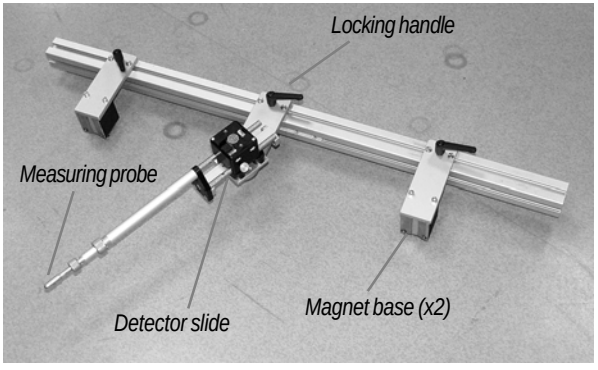


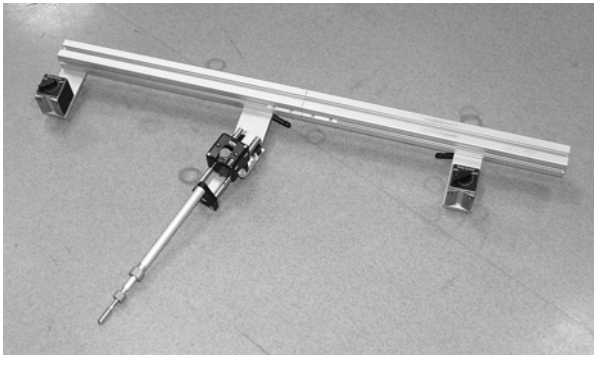
Picture of mounted equipment.



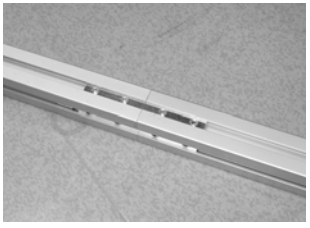
Bracket arms mounted on shaft flange.

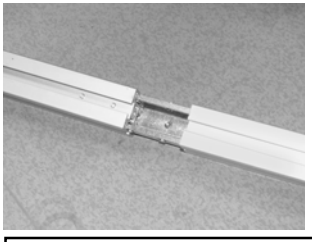
Detector fixture

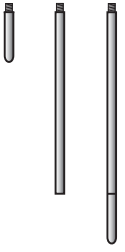




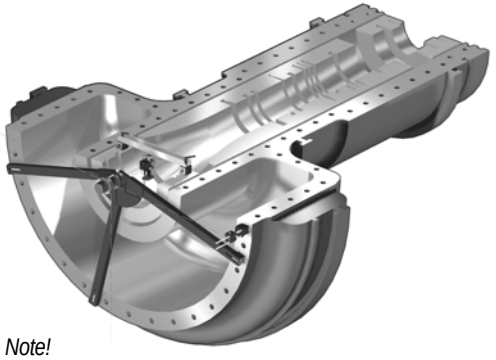
The design of the fixture allows for many different ways of mounting the magnet bases and detector slide.
The fixture can easily be extended if needed (see pictures up to the right).





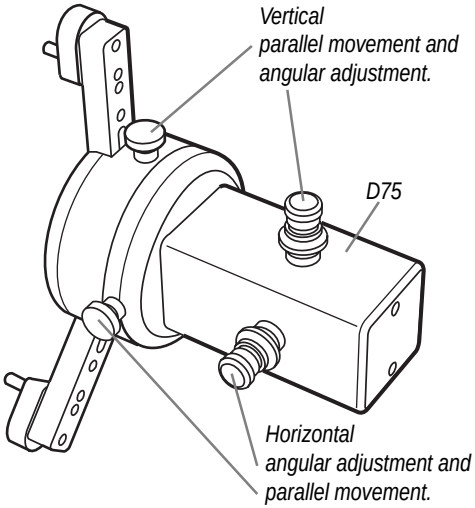


Instead of the pictured probe standard rods can be used to extend the measuring range.



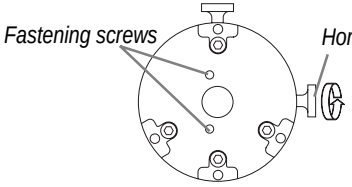
Note!
On special request we manufacture a measurement system for turbines where the axial flange and the center line of the turbine housing are the references to which the journals and diapraghms are adjusted.

Coordinate hub with three arms and magnets
for mounting and parallel movement (adjustment to centre) of the laser transmitter D75.

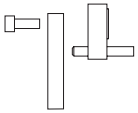


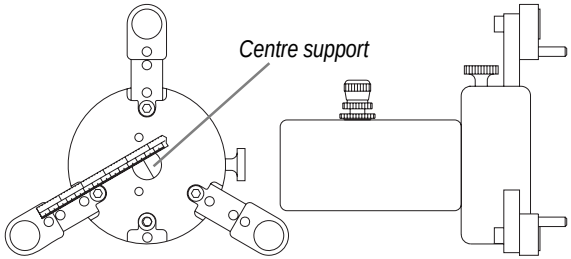
Coordinate hub with laser and arms mounted.

TECHNICAL SPECIFICATIONS	
Laser adjustment	±5 mm [3/16”] in 2 axis
Dimensions	Ø99x62 mm [3 7/8”x2 3/8”]
Housing material	Aluminum
Coordinate table weight	1 kg [2.2 lbs]
Arms for diameters	Ø100–500 mm [4–20”]
Weight	1.2 kg [2.6 lbs]



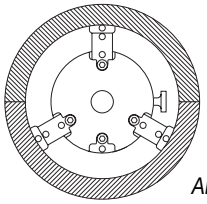
When mounting the laser on the coordinate hub, screw the horizontal adjustment as far out as possible so that the two fastening screws for the laser can be reached.



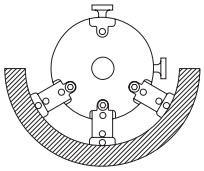


Measure and adjust the arms to the radius. Adjust the third arm when the unit is in position in the measuring object.

Placing the laser in a bearing journal:

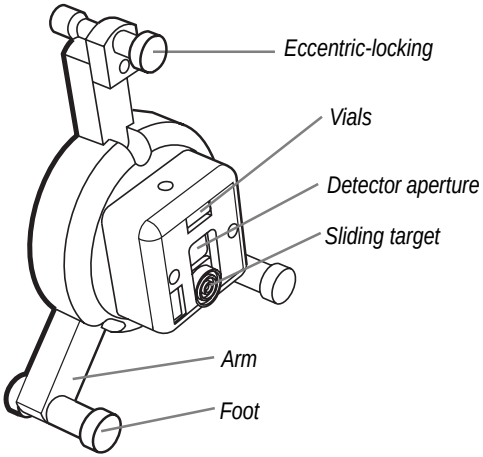


Alt. 1



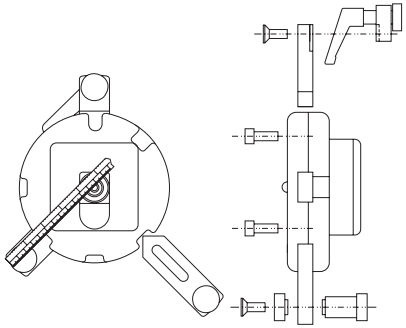
Alt. 2. One of the arms mounted downwards when the upper bearing journal part is removed.

Detector with offset hub. Built-in electronic 360° inclinometer. Three adjustable arms for placing the detector in circular measurement places.



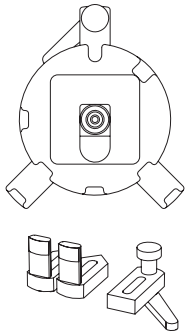
TECHNICAL SPECIFICATIONS	
Detector type	2-axis PSD
Detector size	18x18 mm [3/4”x3/4”]
Linearity	Better than 1%
Vials scaling	5 mm/m [0.3°]
Inclinometer resolution	0.1°
Dimensions	Ø99x60 mm [3 7/8”x2 3/8”]
Housing material	Aluminum
Weight detector	400 g [14 oz]
Measuring diameters	Ø100–500 mm [4–20”]
Weight for set of arms	2.4 kg [5.3 lbs]

Detector mounting for Ø150–500 mm

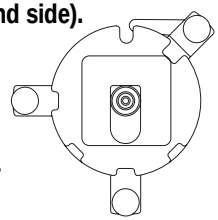


Measure and adjust the arms to the radius. The arm with eccentric-locking should be adjusted in the measured object.

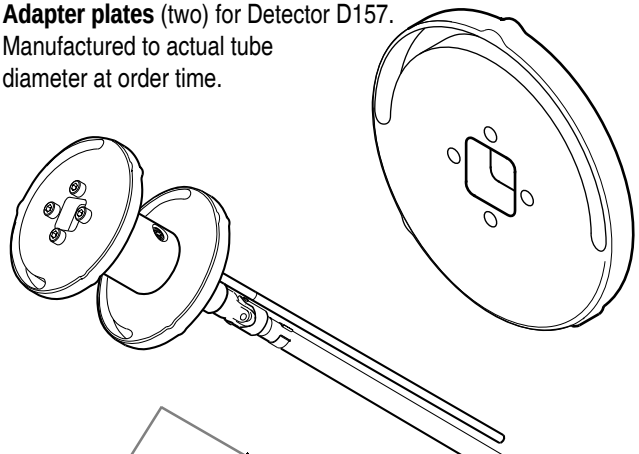
Alternative arms for Ø100–150 mm

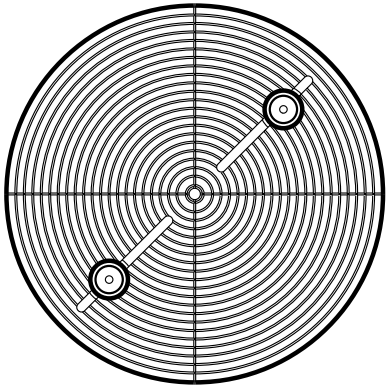


Arms in vertical and horizontal position (measurement at bottom and side).



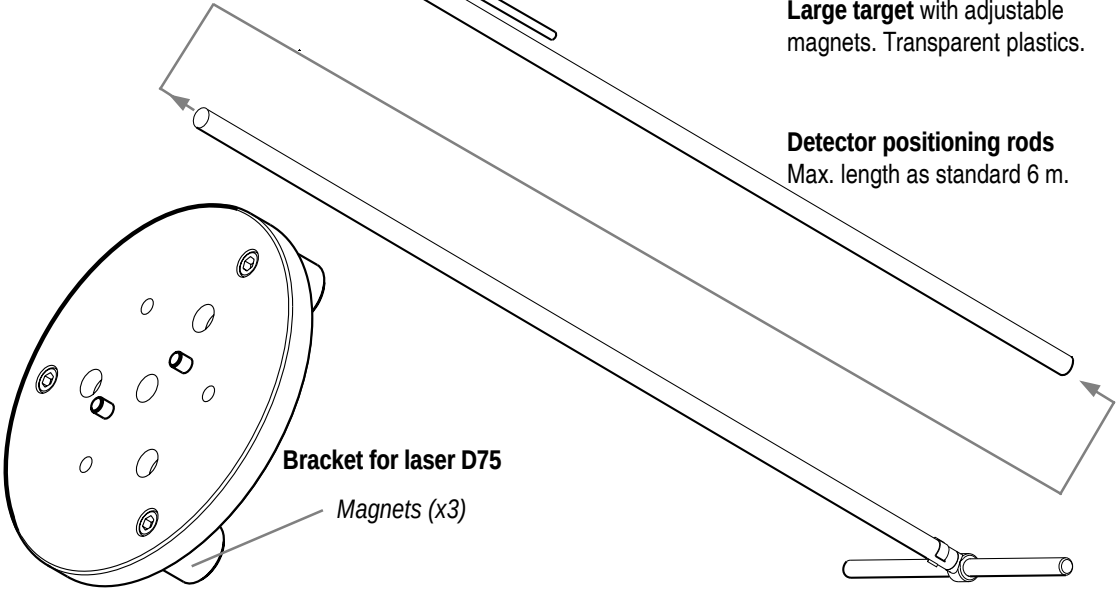
Adapter plates (two) for Detector D157.
Manufactured to actual tube
diameter at order time.





Large target with adjustable
magnets. Transparent plastics.

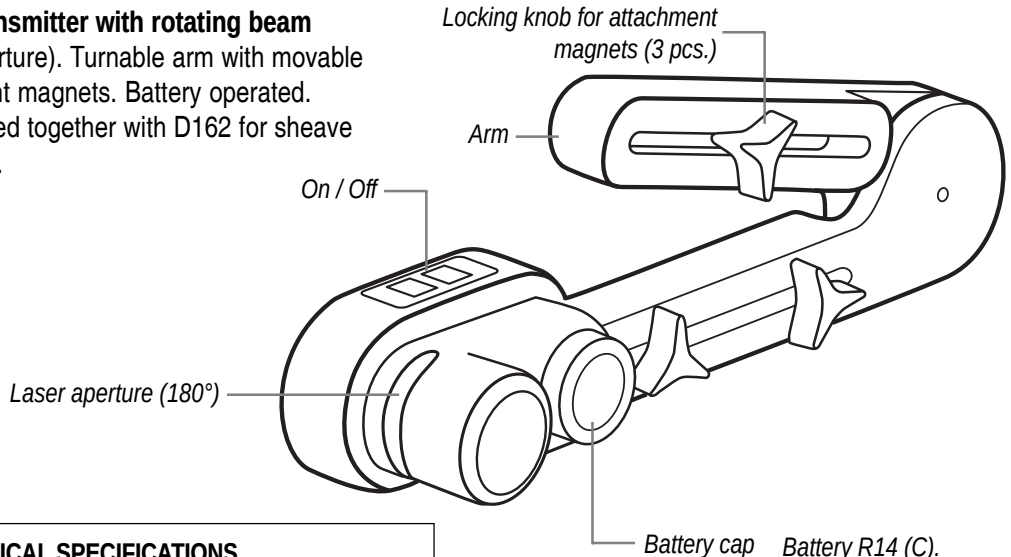
Detector positioning rods
Max. length as standard 6 m.



Bracket for laser D75

Magnets (x3)

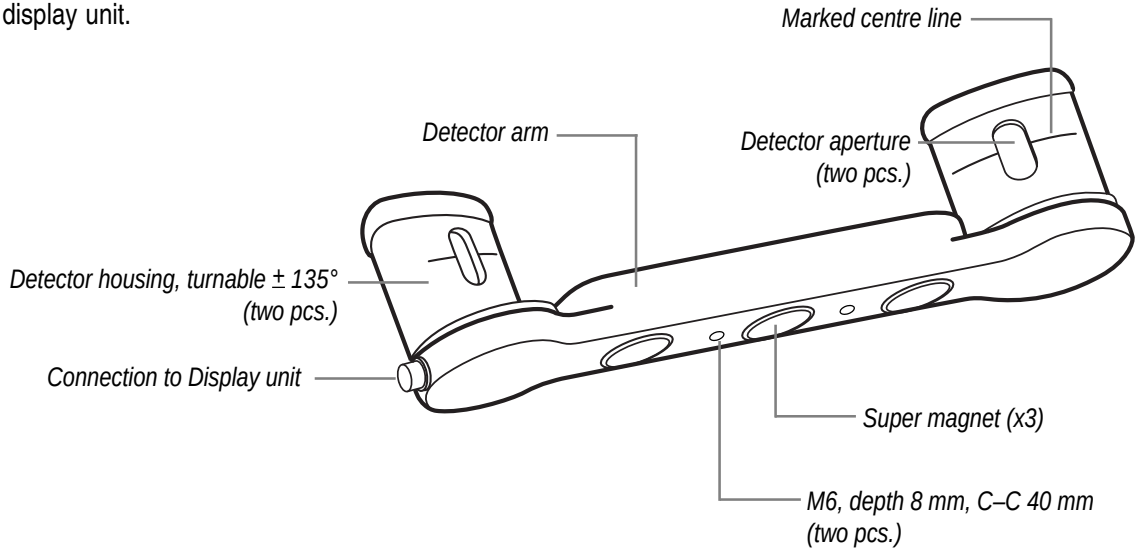
Laser transmitter with rotating beam (180° aperture). Turnable arm with movable attachment magnets. Battery operated. Mainly used together with D162 for sheave alignment.



TECHNICAL SPECIFICATIONS

Sheave diameters	Ø 60 mm and larger
Sheave width	Not depending on width
Laser aperture	180°
Measurement range	10 m radially
Battery type	1xR14 (C)
Operating time	15 hrs. continuously
Laser class	2
Output power	<1 mW
Laser wave length	635–670 nm
Housing material	Anodized aluminum
Dimensions	WxHxD: 300x60x65 mm
Weight	1.3 kg [2.9 lbs]

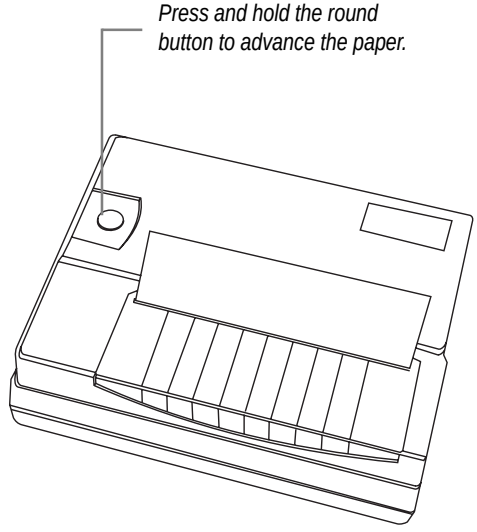
Detector unit with two turnable PSD detector housings. Three attachment magnets, connection to display unit.



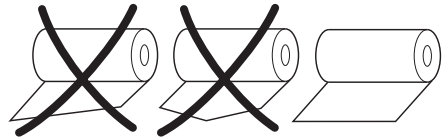
TECHNICAL SPECIFICATIONS	
Detectors	1 axis PSD (x2)
PSD range	±8 mm
Safety class	IP 65
Housing material	Anodized aluminum
Dimensions	WxHxD: 250x50x65 mm
Weight	600 g [21 oz]

Thermal printer for Easy-Laser® systems.
When the power is turned on, the printer performs many internal tests and initializations. When the tests are completed, the printing head moves. The indicator lights up, and the printer is then ready for use.

The red indicator shows the state of the printer:
Constant light – printer ready
Flashing slow, short lighting – memory full, wait to launch the next printing
Flashing slow, short extinction – Battery charging in progress
Flashing fast – printing head jammed; turn the printer off, remove the paper and replace it correctly.
No light – printer needs to be charged. (First check that the printer is turned on.)

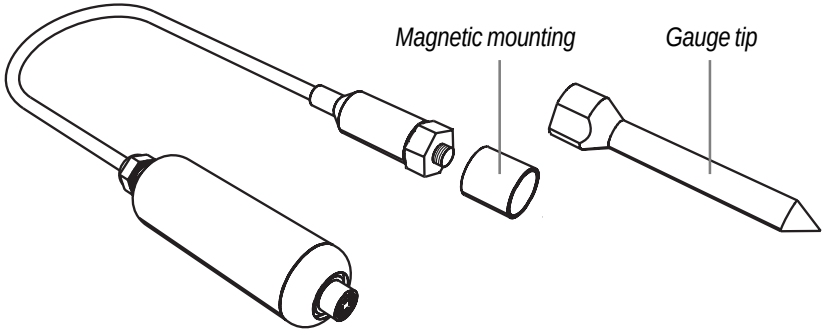


TECHNICAL SPECIFICATIONS	
Interface	Serial RS232C, 9600 bauds
Power supply	Battery.
Operating conditions	5–35° C, 20–70% humidity
Dimensions	165x135x50 mm
Weight	560g [19 oz], with a 20 m paper roll
Roll paper	Thermal black printing, Part No.03-0041 width 112 mm, length 20 m diameter 42 mm.
Spare printer cable	Part No. 03-0241



When replacing the paper roll, cut the paper straight.

Vibrometer probe D283: To use together with the Vibrometer program in display unit D279.



TECHNICAL SPECIFICATIONS

(Instrument/Software)	
Measurement range	0–50 mm/s [0–2 inch/s] RMS
Resolution	0.1 mm/s [0.01 inch/s]
Frequency range	Total level: 2–3200 Hz (Lp), 10–3200 Hz (Hp)
	Bearing condition: 3200–20000 Hz
(Probe)	
Sensitivity	100 mV/g +/-10%
Dimensions	Magnet: L=20 mm [4/5"], Ø=15 mm [19/32"]
	Gauge tip: L=65 mm [2 1/2"9

The tilting screws on the levelling table of the D22 and D23 lasertransmitter, and on the D75 transmitter have to be operated carefully and according to instructions on this page.

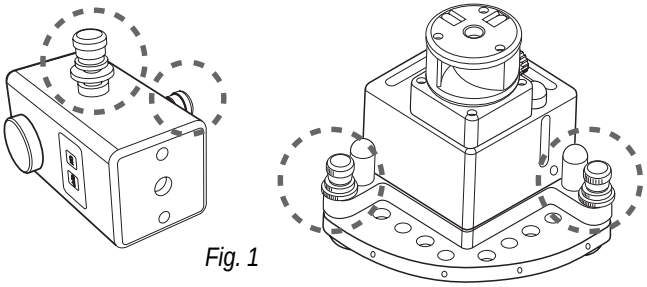


Fig. 1

Visual rough alignment to (detector) target

Check the position of the fine adjustment screw (C). It should be in its nominal position appr. 2.5 mm according to the figure (Fig. 2).

1. Loosen the locking screw (A)
2. Adjust with the course screw (B) to wanted position.
3. Tighten the locking screw (A)

Digital fine adjustment to detector and read values

Important! *The fine adjustment screw (C) must not exceed its upper (Max.) position (Fig. 3). That might damage the threads of the screw.*

1. Check so that the locking screw (A) is tightened.
2. Adjust with the fine adjustment screw (C) to wanted value.

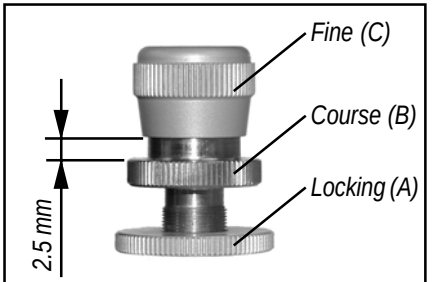


Fig. 2. Nominal position

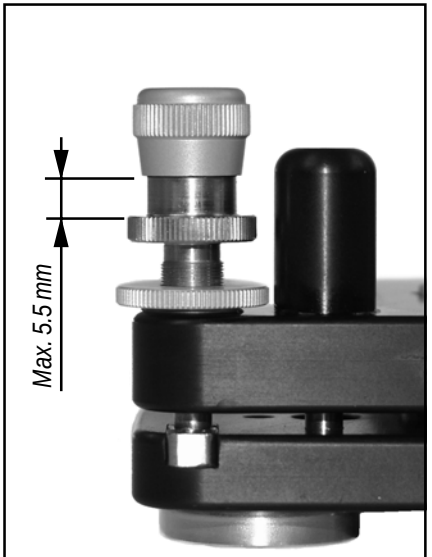


Fig. 3. Maximal adjustment